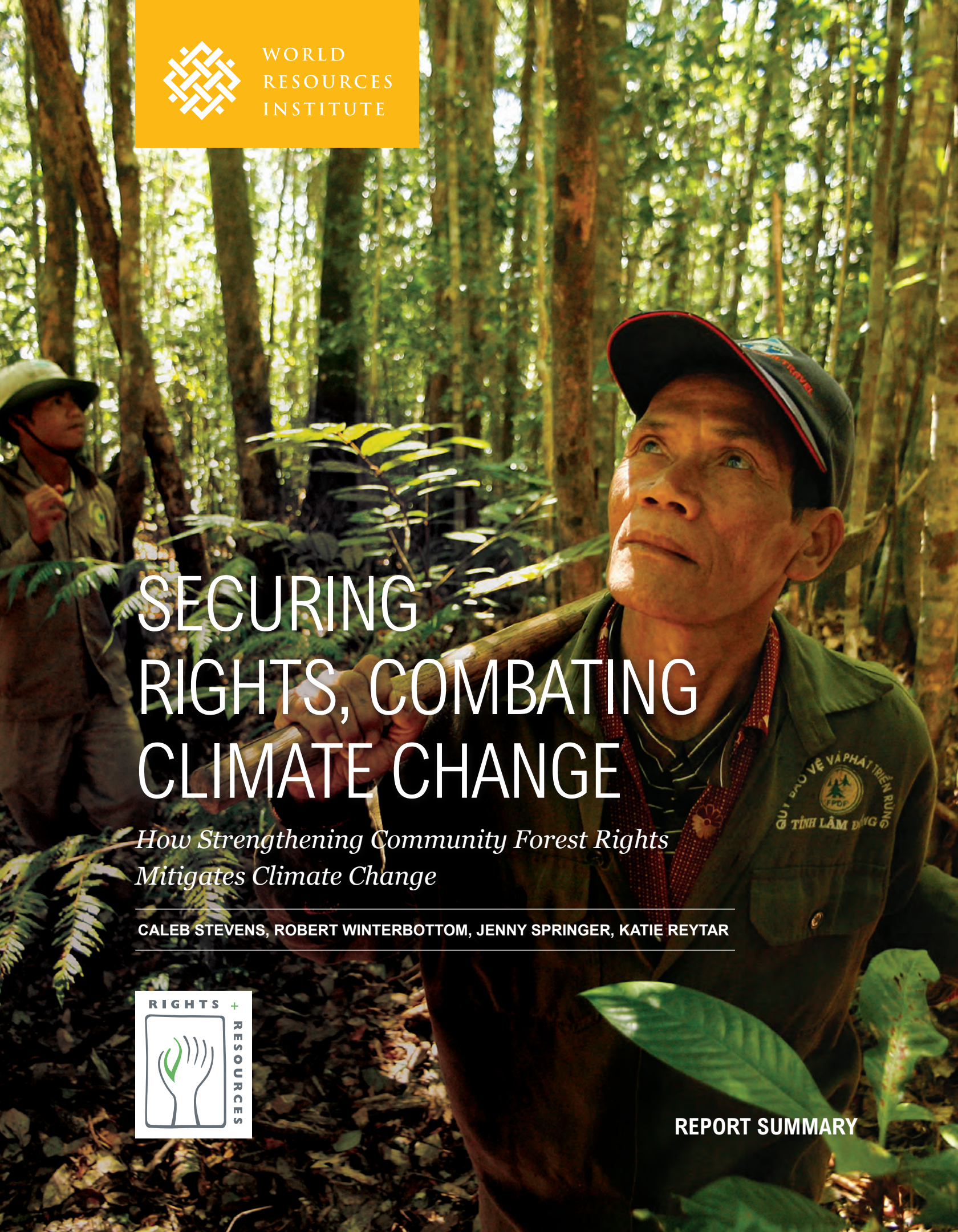


WORLD RESOURCES INSTITUTE

SECURING RIGHTS, COMBATING CLIMATE CHANGE

How Strengthening Community Forest Rights Mitigates Climate Change

CALEB STEVENS, ROBERT WINTERBOTTOM, JENNY SPRINGER, KATIE REYTAR

RIGHTS + RESOURCES

REPORT SUMMARY

An Undervalued Approach to Mitigating Climate Change

The international community agrees on the urgent need to reduce greenhouse gas emissions from deforestation and forest degradation. With 13 million hectares of forest cleared every year, at a rate of 50 soccer fields a minute, such efforts are critical to curbing climate change before it reaches a dangerous tipping point.[1] But we are missing a vital opportunity to combat climate change—strengthening the land and resource rights of Indigenous Peoples and local communities whose well-being is tied to their forests.

This approach to mitigating climate change has long been undervalued. Although governments claim ownership over most of the world's forests, the real stewards of much of these areas are Indigenous Peoples and local communities with deep historical and cultural connections to the land. Around the world, millions of communities depend on forests for basic needs and livelihoods. These Indigenous Peoples and local communities can help avoid the destruction of the forests and associated carbon dioxide (CO_2) emissions and instead maintain their forests as carbon sinks, absorbing harmful CO_2 from the atmosphere.

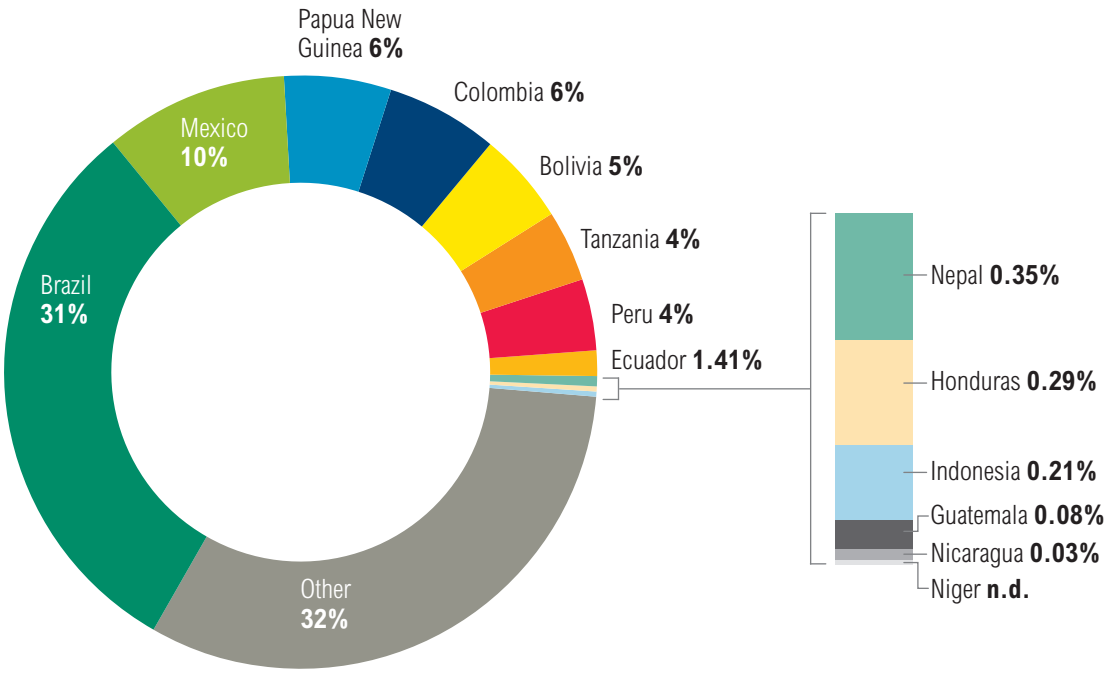
Indigenous Peoples and local communities today have legal or official rights to at least 513 million hectares of forests, only about one eighth of the world's total.[2] Collectively these forests contain approximately 37.7 billion tonnes of carbon, about equal to the carbon in all the forests of North America.[3] If this carbon were released into the atmosphere as CO_2, it would be approximately equal to 29 times the annual CO_2 emissions produced by all the passenger vehicles in the world.[4] Much larger areas of forest are held by communities under customary rights that are not legally recognized by governments. Most community forests are in low- and middle-income countries with strong deforestation pressures. Yet governments, donors, and other climate change stakeholders tend to ignore or marginalize the enormous contribution to mitigating climate change that expanding and strengthening communities' forest rights can make.

With deforestation and other land uses now accounting for about 11 percent of annual global greenhouse gas emissions,[5] weak legal protection for forest communities is not just a land or resource rights problem. It is a climate change problem. Preventing actions that undermine community forest rights is part of the solution. The report aims to encourage the international community to prioritize support for forest communities in the developing world as a bulwark against rising global temperatures.

About the Report

Securing Rights, Combating Climate Change analyzes the growing body of evidence linking community forest rights with healthier forests and lower CO_2 emissions from deforestation and forest degradation. It presents a compelling case for expanding and strengthening community forest rights based on evidence drawn from comparative studies, advanced quantitative research, case studies, and original deforestation and carbon analyses by the World Resources Institute (WRI). The findings center on examples from 14 forest-rich countries in Latin America, Africa, and Asia: Bolivia, Brazil, Colombia, Ecuador, Guatemala, Honduras, Indonesia, Mexico, Nepal, Nicaragua, Niger, Papua New Guinea, Peru, and Tanzania. Together, these countries contain about 323 million hectares of government-recognized community forest—68 percent of the estimated total in all low- and middle-income countries—as well as large areas of community forests without legal or official recognition.[6] *(See Figure 1.)* The report's analysis focuses on the links between legal community forest rights (or lack thereof), the extent of government protection of those rights, and forest outcomes. *(Please see the full report for a detailed discussion of the findings and a complete list of references.)*

Figure 1 | **Government-Recognized Community Forests by Country as Percentage of Total Government-Recognized Community Forests in Low- or Middle-Income Countries**



Source: RRI, 2014. Data on government-recognized community forest in Ecuador are from *Red Amazónica de Información Socioambiental Georreferenciada* (RAISG, 2012). Data on the amount of community forest in Nicaragua are from Inventario Nacional Forestal, 2008.

Carbon Sink versus Carbon Source

Securing Rights, Combating Climate Change shows more clearly than ever that deforestation rates inside community forests with strong legal recognition and government protection are dramatically lower than in forests outside those areas. An area slightly larger than Greece, at 22 million hectares, is held by Indigenous Peoples in Bolivia.[7] From 2000 to 2010, only about 0.5 percent of land on legally recognized indigenous community forest was deforested, compared with 3.2 percent deforestation in the Bolivian Amazon.[8] Rates of deforestation were thus six times lower in forests where Indigenous Peoples have legal rights and government protection than in other forests. From 1986 to 2007, most legally recognized community forests in Guatemala's Maya Biosphere Reserve experienced only 0.02 percent deforestation compared with 0.41 percent in the Reserve's so-called Protected Area where no tree cutting is permitted—about 20 times less deforestation.[9]

About 8.1 million hectares of Mexico's forests are under community forest management.[10] A sample of only five community-managed forests, totaling 375,500 hectares, estimated their carbon storage potential to be 64.1 million tonnes of carbon.[11] The climate change mitigation benefits would be even greater if extended to include the thousands of community forests in Mexico. Further, community-managed forests in Mexico's Yucatan Peninsula have recorded lower deforestation rates than even government-protected areas designated for strict conservation.[12] For example, from 2000 to 2005 the Calakmul Biosphere Reserve in Yucatan experienced a deforestation rate of 0.7 percent, compared with a rate of practically zero (0.002 percent) from 2000 to 2004 for a nearby community-managed forest.[13]

The report also offers cautionary tales of what happens to forests when governments undermine community forest rights. For example, according to the Amazon NGO RAISG, three legally recognized indigenous lands in the northwest of Peru—*Huascayacu*, *Alto Mayo*, and *Shimpiyacu*—lost, respectively, 51 percent, 33 percent, and 24 percent of their forest between 2000 and 2010—some of the worst deforestation in the entire Amazon.[14] Government allocations of indigenous lands to mining, oil, and natural gas concessions are a major cause of these devastating deforestation levels. Oil and gas concessions cover nearly 75 percent of the Peruvian Amazon.[15] Fully 87 percent of Peruvian indigenous lands in part of Madre de Dios overlap with mining, oil, and gas concessions and other conflicting land uses.[16]

In Papua New Guinea, almost all forests are owned by communities, but the government has issued leases to private companies covering about 4 million hectares—an area the size of Switzerland.[17] If logged to convert the forest to oil palm or other non-forest uses, areas covered by these leases could release almost 3 billion tonnes of CO_2.[18]

Finally, in Indonesia out of at least 42 million hectares of indigenous community forests, only 1 million hectares are legally recognized by the government. The government routinely allocates indigenous community forests for oil palm concessions, industrial timber plantations for pulp and paper, and other conflicting land uses.[19] In the Eastern Papua region, communities are being manipulated into consenting to long-term commercial use of their land for less than US$1 per hectare per year.[20]

However, as indicated earlier, when governments act to recognize and protect community forest rights, deforestation rates can be sharply reduced. One of the most successful cases discussed in the report is that of Brazil's Indigenous Lands. The indigenous communities help protect the Brazilian Amazon from deforestation with government support. Other heavily forested low- and middle-income countries can protect their forest, reduce their CO_2 emissions, and provide other benefits to forest communities by following Brazil's approach.

A Model of Success: Brazil's Indigenous Lands

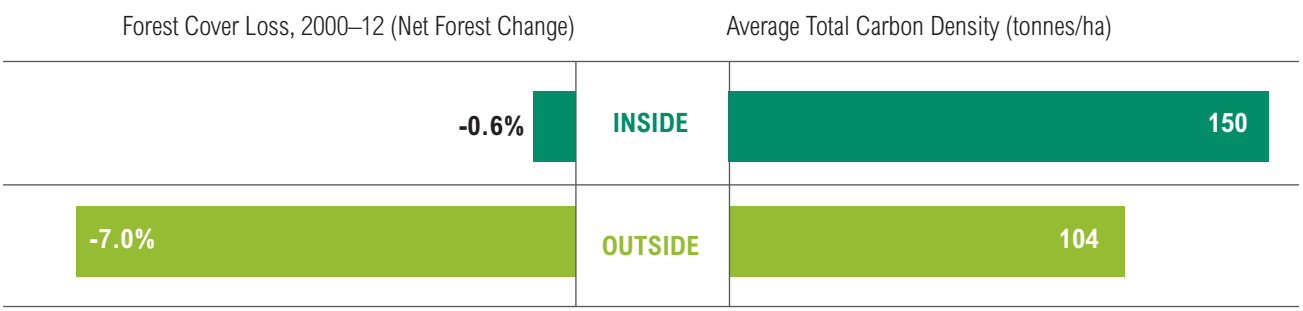
With about 63 billion tonnes of carbon locked in its biomass, Brazil has the most carbon-rich forests in the world.[21] The Brazilian Amazon contains about half the world's remaining tropical rainforest and 10 percent of the carbon stored in all land ecosystems.[22] Much of this carbon is in community forests, including a large number of legally recognized indigenous community forests. However, Brazil is also one of the largest emitters of greenhouse gases from deforestation in the world[23] and the site of most Amazon deforestation.[24] Yet, analysis shows that recognition of community forest rights is strongly associated with reduced deforestation, indicating CO_2 emissions from deforestation would almost certainly be worse if indigenous communities did not have legal forest rights and government protection.

From 1980 to 2007, about 300 Indigenous Lands were legally recognized in Brazil, although completion of the official mapping and registration process has proved slow. These indigenous community forests, officially termed Indigenous Lands, vest the community with the perpetual right to exclude others and to manage and use the forest sustainably, with the government retaining formal ownership. Forest resources may be used for commercial purposes subject to an approved sustainability plan, but cutting trees for sale requires approval by the National Legislature. Importantly, Indigenous Peoples' right to exclude others extends to subsurface minerals, with the government generally barred from allocating mineral rights in these areas.[25]

Numerous studies show the effectiveness of Indigenous Lands at resisting deforestation pressures in Brazil. Nolte et al. compared the ability of government-protected areas, sustainable-use areas, and indigenous community forests to resist deforestation and concluded that Indigenous Lands "were consistently estimated to face the highest levels of deforestation pressures and to have achieved the greatest avoided deforestation."[26] Similarly, Nepstad et al. found that Indigenous Lands "strongly inhibited deforestation in the active agricultural frontier."[27]

These findings are supported by a WRI deforestation analysis for the Brazilian Amazon. From 2000 to 2012, forest loss was only 0.6 percent inside Indigenous Lands compared with 7.0 percent outside. *(See Figure 2.)* Figure 3 shows a section of the Brazilian Amazon under intense deforestation pressure. Forest loss between 2000 and 2012 is clustered close to, but rarely inside, the borders of Indigenous Lands.

Figure 2 | **Comparing Forest Cover Loss, 2000–12, and Average Carbon Density Inside and Outside Indigenous Lands in the Brazilian Amazon**



Source: Hansen et al., 2013. Carbon data from Saatchi et al., 2011.

Figure 3 | **Satellite-Detected Tree Cover Loss in Brazil, 2000–12, for Indigenous Lands in the Southwest of the Brazilian Amazon**

Source: Forest cover loss data are from Hansen et al., 2013, and depict forest change at a spatial resolution of 30 meters across the globe. Data for Indigenous Lands are from the Ministry of Justice's National Indian Foundation (Fundação Nacional do Índio, 2013). The number of Indigenous Lands in the dataset is 371, which includes both fully recognized lands and those still in the registration process. NOTE: FUNAI's data on community lands show about 35 million fewer hectares than data from RRI. The reason for the discrepancy is FUNAI's data are for Indigenous Lands—not, as in the RRI data, for other tenure types: Extractive Reserves, Sustainable Development Reserves, Agro-Extractive Settlement Projects, Forest Settlement Projects, Sustainable Development Projects, and Quilombolas (peoples of African descent) Territories.

The Brazilian government generally protects Indigenous Peoples' forest rights, but Indigenous Peoples often forcefully defend their own forest by expelling loggers, ranchers, and other intruders.[28] Indigenous Lands are the only areas of the Amazon with roads cutting across them that have not succumbed to deforestation.[29] The roads do not always go around Indigenous Lands, but the deforestation does.

As a result, community forests in the Brazilian Amazon tend to be relatively carbon-rich, containing 36 percent more carbon per hectare than areas of the Brazilian Amazon outside Indigenous Lands.[30] *(See Figure 2.)*

WRI's analysis of deforestation and carbon stock found that 27 times more CO_2 emissions were produced outside Indigenous Lands than inside from 2000 to 2012. Forest cover loss of 22.5 million hectares in the Brazilian Amazon outside Indigenous Lands resulted in 8.7 billion tonnes of CO_2 emitted during those years. In the same period, 311 million tonnes of CO_2 emissions were produced from deforestation of about 677,000 hectares of forest on Indigenous Lands.

Brazil's Indigenous Lands therefore play a significant role in keeping CO_2 emissions from the atmosphere. One estimate suggests that Indigenous Lands and government-protected areas in the Brazilian Amazon could prevent 27.2 million hectares of deforestation by 2050, an area slightly larger than the United Kingdom. If the carbon in this large forest area were emitted as CO_2, it would amount to approximately 12 billion tonnes of CO_2[31]—the equivalent of about three years' worth of CO_2 emissions from all Latin American and Caribbean countries.[32]

Overall Findings

- **When Indigenous Peoples and local communities have no or weak legal rights, their forests tend to be vulnerable to deforestation and thus become the source of carbon dioxide emissions.** Deforestation of indigenous community forests in Brazil would likely have been 22 times higher without their legal recognition. In Indonesia, the high levels of carbon dioxide emissions from deforestation are driven in part by no or weak legal rights for forest communities. For example, oil palm concessions cover 59 percent of community forests in part of West Kalimantan.

- **Legal forest rights for communities and government protection of their rights tend to lower carbon dioxide emissions and deforestation.** *(See Figure 4.)* In Brazil, deforestation in indigenous community forests from 2000 to 2012 was less than 1 percent, compared with 7 percent outside them. The higher deforestation outside indigenous community forests led to 27 times more carbon dioxide emissions than were produced from deforestation on indigenous community forests. And indigenous community forests contain 36 percent more carbon per hectare than other areas of the Brazilian Amazon.

Figure 4 | **Summary of Analysis of How Community Forest Rights and Government Action Impact Forests**

COUNTRY	LEGAL RIGHTS	GOV. ACTION	FOREST OUTCOMES
Bolivia (Amazon)	✓	✓	↑
Brazil (Amazon)	✓	✓	↑
Colombia (Amazon)	✓	X	↑
Ecuador (Amazon)	✓	X	🪓
Guatemala (Petén)	✓	✓	↑
Honduras (Rio Platáno)	✓	X	↑
Mexico	✓	✓	↑
Nicaragua (Bosawas)	✓	X	↑
Peru (Amazon)	✓	X	🪓
Niger	✓	✓	↑
Tanzania	✓	✓	↑
Nepal	✓	✓	↑
Indonesia	X	X	🪓
Papua New Guinea	✓	X	🪓

CHART KEY

LEGAL RIGHTS	GOVERNMENT ACTION	FOREST OUTCOMES
✓ = Legal Recognition	✓ = Positive Government Action on Strength of Rights	↑ = Positive Forest Outcomes
X = No/Weak Legal Recognition	X = Negative Government Action on Strength of Rights	🪓 = Negative Forest Outcomes

Please see the full report for more information on the specific legal rights recognized.

- **Indigenous Peoples and local communities with legal forest rights maintain or improve their forests' carbon storage.** Government protection of the forest rights of communities in Niger added 200 million new trees, absorbing 30 million tonnes of carbon over the past 30 years. Support for community forestry in Nepal has improved forest health and generated a carbon stock of more than 180 million tonnes across 1.6 million hectares.

- **Even when communities have legal rights to their forest, government actions that undermine those rights can lead to high carbon dioxide emissions and deforestation.** The forests of indigenous communities in Peru, where government actions weaken community forest rights, are deforested at a higher rate than other parts of the Peruvian Amazon.

- **Communities can partially overcome government actions that undermine their forest rights.** In Honduras and Nicaragua, indigenous communities have been able to partially forestall deforestation despite insufficient government efforts to protect their rights. In some cases, community forest loss is 0.01 percent, compared with 1.40 percent in the surrounding area.

Recommendations

Based on these findings, the authors make five practical, evidence-based recommendations to donors, governments, civil society, and other stakeholders working on climate change, land rights, and forestry.

- **Provide Indigenous Peoples and local communities with legal recognition of rights to their forest.** Attention must be given to the millions of forested communities without legal rights to their forest. In Indonesia, where communities generally have no or weak legal rights, new legislation is pending to recognize communities' ownership of their forests. Where communities have some legal forest rights, governments and their partners should strengthen these rights. While this recommendation applies to all relevant countries, those that are heavily forested and have weak community forest rights are of critical importance. In addition, stakeholders should support strengthening community forest rights as part of a future agreement on REDD+.

- **Protect the legal forest rights of communities.** Governments and their partners should help protect community forest rights by, for example, mapping community forest boundaries, helping to expel illegal loggers, and not granting commercial concessions over community forests. In Brazil, the government maps and registers indigenous community forests, helps communities remove illegal settlers, and is generally barred from granting commercial use of community forests to companies. Governments and their partners should commit funds and invest in supporting communities and their civil society partners. In addition, governments and donors should include programs to support community forest rights in their climate change strategies.

- **Support communities with technical assistance and training.** Governments, donors, and civil society should provide training and technical assistance to communities and should undertake capacity building activities. For example, in Mexico some communities receive training and support from the government to improve sustainable forest use and market access. In addition, governments, donors, and civil society should help ensure that Indigenous Peoples and local communities are able to participate genuinely in the development of legal and policy frameworks related to REDD+.

- **Engage forest communities in decision-making on investments affecting their forest.** Governments and businesses should work together to ensure that government planning is consistent with international standards and that investments do not violate community forest rights. In Peru, the government's failure to comply fully with international standards contributes to high deforestation of indigenous community forests. For example, national laws should require that the status of Indigenous Peoples and local community forest is determined well in advance of any decisions affecting the community. Also, if legal commercial extraction of subsurface minerals does occur on indigenous or local community forestlands, ensure that the extraction is conducted in the least invasive way possible and only after free, prior, and informed consent of the affected communities.

- **Compensate communities for the climate and other benefits provided by their forest.** Governments and their partners should commit funds and invest in supporting communities and their civil society partners to increase the economic incentives for communities to manage their forests sustainably. In addition, stakeholders should support strengthening of community forest rights as part of a future agreement on REDD+. Ensure that communities receive payments for protecting their forests as part of the design and implementation of REDD+.

REFERENCES

Bray, D. B. 2010. *Toward Post-REDD+ Landscapes: Mexico's Community Forest Enterprises Provided a Proven Path to Reduce Emissions from Deforestation and Forest Degradation*. Bogor, Indonesia: Center for International Forestry Research.

Carlson, K., L. M. Curran, D. Ratnasari, A. M. Pittman, B. S. Soares-Filho, G. P. Asner, S. N. Trigg, D. A. Gaveau, D. Lawrence, and H. O. Rodrigues. 2012. "Committed Carbon Emissions, Deforestation, and Community Land Conversion from Oil Palm Plantation Expansion in West Kalimantan, Indonesia." *Proceedings of the National Academy of Sciences* 109: 7559–7564.

Davis, D. C. 2013. "Land in the Second Decade: The Evolution of Indigenous Property Rights and the Energy Industry in the United States and Brazil." *Energy Law Journal* 34: 667–686.

Ellis, E., and L. Porter-Bolland. 2008. "Is Community-Based Forest Management More Effective than Protected Areas? A Comparison of Land Use/Land Cover Change in Two Neighboring Study Areas of the Central Yucatan Peninsula, Mexico." *Forest Ecology and Management* 256: 1971–1983.

Filer, C. 2011. "The New Land Grab in Papua New Guinea." *Pacific Studies* 34: 269–294.

FAO (Food and Agriculture Organization of the United Nations). 2010. *Global Forest Resources Assessment 2010*. Rome: FAO.

Fundação Nacional do Índio. 2013. "Terras Indígenas do Brasil." Brasilia: Ministerio da Justiça do Brasil, Fundação Nacional do Índio.

Greenpeace. 2012. "Up for Grabs: Millions of Hectares of Customary Land in PNG Stolen for Logging." Ultimo, Australia: Greenpeace Australia Pacific.

Hansen, M., P. V. Potapov, R. Moore, M. Hancher, S. A. Turubanova, A. Tyukavina, D. Thau, S. V. Stehman, S. J. Goetz, T. R. Loveland, A. Kommareddy, A. Egorov, L. Chini, C. O. Justice, and J. R. G. Townshend. 2013. "High-Resolution Global Maps of 21st-Century Forest Cover Change." *Science* 342(6160): 850–853.

Hughell, D., and R. Butterfield. 2008. *Impact of FSC Certification on Deforestation Incidence of Wildfires in the Maya Biosphere*. New York: Rainforest Alliance.

IDB (Inter-American Development Bank). 2012. *Challenges for Low-Carbon Agriculture and Forest Conservation in Brazil*, Technical Notes No. IDB-TN-385. Washington, DC: IDB.

Inventario Nacional Forestal. 2008. *Resumen de Resultados del Inventario Nacional Forestal: 2007–2008*. Nicaragua.

IRIN News. 2014. "Conflict in Indonesia's Papua Region." March 28.

Klooster, D., and O. Masera. 2000. "Community Forest Management in Mexico: Carbon Mitigation and Biodiversity Conservation through Rural Development." *Global Environmental Change* 10: 259–72.

Nepstad, D., S. Schwartzman, B. Bamberger, M. Santilli, D. Ray, P. Schlesinger, P. Lefebvre, A. Alencar, E. Prinz, G. Fiske, and A. Rolla. 2006. "Inhibition of Amazon Deforestation and Fire by Parks and Indigenous Lands." *Conservation Biology* 20(1): 65–73.

Nolte, C., A. Agrawal, K. M. Silvius, and B. S. Soares-Filho. 2013. "Governance Regime and Location Influences Avoided Deforestation Success of Protected Areas in the Brazilian Amazon." *Proceedings of the National Academy of Sciences*. doi: 10.1073/pnas.1214786110.

Oxfam. 2014. *Geographies of Conflict: Mapping Overlaps between Extractive Industries and Agricultural Land Uses in Ghana and Peru*. Oxfam Research Report. Boston: Oxfam America.

RAISG (Red Amazónica de Información Socioambiental Georreferenciada). 2012. *Amazonia Under Pressure*. Available at www.raisg.socioambiental.org.

Ricketts, T. H., B. Soares-Filho, G. A. B. da Fonseca, D. Nepstad, A. Pfaff, A. Petsonk, A. Anderson, D. Boucher, A. Cattaneo, M. Conte, K. Creighton, L. Linden, C. Maretti, P. Moutinho, R. Ullman, and R. Victurine. 2010. "Indigenous Lands, Protected Areas, and Slowing Climate Change." *PLoS Biology* 8(3): e1000331.

RRI (Rights and Resources Initiative). 2014. *What Future for Reform? Progress and Slowdown in Forest Tenure Reform since 2002*. Washington, DC: RRI.

Saatchi, S. S., N. L. Harris, S. Brown, M. Lefsky, E. T. A. Mitchard, W. Salas, B. R. Zutta, W. Buermann, S. L. Lewis, S. Hagen, S. Petrova, L. White, M. Silman, and A. Morel. 2011. "Benchmark Map of Forest Carbon Stocks in Tropical Regions across Three Continents." *Proceedings of the National Academy of Sciences* 108(24): 9899–9904.

Scullion, J., K. A. Vogt, A. Sienkiewicz, S. J. Gmur, and C. Trujillo. 2014. "Assessing the Influence of Land-Cover and Conflicting Land-Use Authorizations on Ecosystem Conversion on the Forest Frontier of Madre de Dios, Peru." *Biological Conservation* 171: 247–258.

Searchinger, T., C. Hanson, J. Ranganathan, B. Lipinski, R. Waite, R. Winterbottom, A. Dinshaw, and R. Heimlich. 2013. *Creating a Sustainable Food Future: A Menu of Solutions to Sustainably Feed More than 9 Billion People by 2050*. Washington, DC: World Resources Institute.

Sizer, N., M. Hansen, and R. Moore. 2013. "New High-Resolution Forest Maps Reveal World Loses 50 Soccer Fields of Trees per Minute." Available at http://www.wri.org/blog/2013/11/new-high-resolution-forest-maps-reveal-world-loses-50-soccer-fields-trees-minute.

ENDNOTES

1 Sizer et al., 2013.

2 RRI, 2014; FAO, 2010.

3 FAO, 2010. According to FAO, as of 2010 the total carbon stock in the aboveground and belowground biomass of Canada, Mexico, and the United States was 35.259 billion tonnes.

4 This comparison was made by multiplying 37.7 billion tonnes of carbon by 3.666 to determine its CO_2 equivalent of 138 billion tonnes. Equivalency to annual global passenger vehicle emissions was determined by the Greenhouse Gas Equivalencies Calculator, available at http://www.epa.gov/cleanenergy/energy-resources/calculator.html#results.

5 Searchinger et al., 2013.

6 RRI, 2014.

7 Ibid.

8 RAISG, 2012.

9 Hughell and Butterfield, 2008.

10 Bray, 2010 (Table 1).

11 Klooster and Masera, 2000.

12 Bray, 2010.

13 Ellis and Porter-Bolland, 2008.

14 RAISG, 2012.

15 Oxfam, 2014.

16 Scullion et al., 2014.

17 Filer, 2011.

18 Greenpeace, 2012.

19 Carlson et al., 2012.

20 IRIN News, 2014.

21 FAO, 2010; carbon stock in aboveground living biomass of Brazil's forests totaled 62.607 billion tonnes in 2010.

22 IDB, 2012.

23 FAOSTAT, available at http://faostat3.fao.org/faostat-download-js/PDF/EN/GL.pdf.

24 RAISG, 2012.

25 Davis, 2013 (references Brazilian Constitution, art. 231).

26 Nolte et al., 2013, p. 4957.

27 Nepstad et al., 2006, p. 69.

28 Ibid.

29 Ibid.

30 Saatchi et al., 2011.

31 Ricketts et al., 2010. The authors found: "Simulation models suggest that ILPAs established between 2003 and 2007 could prevent 272,000 km^2 of deforestation through 2050, equal to 3.3 +-1.1 GtC, more than 1/3 of the world's annual CO_2e emissions." To obtain 12 billion tonnes of CO_2 the conservative estimate of 3.3 GtC was converted to billions of tonnes and then multiplied by 3.666, the weight ratio of carbon to CO_2.

32 This equivalency was calculated by reference to WRI's Climate Data Explorer. Available at http://cait2.wri.org/profile/Latin%20America%20&%20the%20Caribbean#Country GHG Emissions.

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ABOUT WRI

WRI is a global research organization that works closely with leaders to turn big ideas into action to sustain a healthy environment—the foundation of economic opportunity and human well-being.

Our Challenge
Natural resources are at the foundation of economic opportunity and human well-being. But today, we are depleting Earth's resources at rates that are not sustainable, endangering economies and people's lives. People depend on clean water, fertile land, healthy forests, and a stable climate. Livable cities and clean energy are essential for a sustainable planet. We must address these urgent, global challenges this decade.

Our Vision
We envision an equitable and prosperous planet driven by the wise management of natural resources. We aspire to create a world where the actions of government, business, and communities combine to eliminate poverty and sustain the natural environment for all people.

ABOUT THE RIGHTS AND RESOURCES INITIATIVE (RRI)

RRI is a global coalition of 14 Partners and over 140 international, regional and community organizations advancing forest tenure, policy and market reforms. RRI leverages the strategic collaboration and investment of its Partners and Collaborators around the world by working together on research, advocacy, and convening strategic actors to catalyze change on the ground. RRI is coordinated by the Rights and Resources Group, a non-profit organization based in Washington, DC.

For more information, please visit www.rightsandresources.org.

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